

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NPRDC TR 83-9	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) TAILORING SHIPBOARD TRAINING TO FLEET PERFORMANCE NEEDS: V. DESIGN AND PRODUCTION OF TRAINING MATERIALS		5. TYPE OF REPORT & PERIOD COVERED Technical Report
		6. PERFORMING ORG. REPORT NUMBER 14-82-18
7. AUTHOR(s) Ray E. Main Iver J. Rivenes John H. Steinemann James G. Chadbourne		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Navy Personnel Research and Development Center San Diego, California 92152		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Z1180-PN.01
11. CONTROLLING OFFICE NAME AND ADDRESS Navy Personnel Research and Development Center San Diego, California 92152		12. REPORT DATE February 1983
		13. NUMBER OF PAGES 48
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Fleet performance Shipboard training Fleet training Training aids Main propulsion systems On-board training On-the-job training		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) To promote the implementation of the shipboard propulsion plant operator training (SPPOT) system within the Fleet, it was necessary to provide guidelines and specifications for the development of SPPOT materials. A SPPOT Development Handbook was designed to provide the information required for effective development of SPPOT materials.		

NPRDC TR 83-9

FEBRUARY 1983

**TAILORING SHIPBOARD TRAINING TO FLEET
PERFORMANCE NEEDS: V. DESIGN AND
PRODUCTION OF TRAINING MATERIALS**

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED



**NAVY PERSONNEL RESEARCH
AND
DEVELOPMENT CENTER,
San Diego, California 92152**



**TAILORING SHIPBOARD TRAINING TO FLEET PERFORMANCE NEEDS:
V. DESIGN AND PRODUCTION OF TRAINING MATERIALS**

Ray E. Main
John H. Steinemann
Iver J. Rivenes
James G. Chadbourne

Reviewed by
Joseph C. McLachlan

Released by
James F. Kelly, Jr.
Commanding Officer

FOREWORD

This research and development was conducted within advanced development subproject Z1180-PN.01 (Enhancing Fleet Training Readiness Through Improved Shipboard Training) under the sponsorship of the Chief of Naval Operations (OP-01). The objectives of the subproject are to design, develop, and evaluate an approach for identifying critical fleet personnel readiness deficiencies and to develop shipboard training programs that are compatible with fleet priorities and with the constraints of an operational environment.

This report is the fifth in a series being issued under this subproject. Previous reports described a survey of shipboard performance problems that led to the selection of 1200 psi main propulsion systems as the target problem area, an analysis to clarify the nature of the performance problems being experienced by main propulsion personnel, the design and development of the shipboard propulsion plant operator training (SPPOT) program for propulsion watchstanders, and the development of SPPOT training modules and administrative materials (NPRDC TRs 78-30, 81-23, 82-6, and 82-61). The current report describes the establishment of methods for the development and implementation of SPPOT materials.

Appreciation is expressed to the Commanding Officer and personnel of the Personnel Qualification Standards Development Group for their suggestions and recommendations regarding the format and content of the SPPOT Development Handbook.

JAMES F. KELLY, JR.
Commanding Officer

JAMES W. TWEEDDALE
Technical Director

CONTENTS

	Page
INTRODUCTION	1
Problem and Background	1
Purpose	1
APPROACH	1
RESULTS AND CONCLUSIONS	2
REFERENCES	3
APPENDIX--SPPOT DEVELOPMENT HANDBOOK	A-0
DISTRIBUTION LIST	

INTRODUCTION

Problem and Background

The increasing complexity of shipboard performance requirements has strained the ability of the fleet to maintain personnel readiness through on-ship instruction. The difficulties of providing shipboard training have been further increased by personnel turbulence and changes in operational requirements. Attempts to develop more adequate shipboard training systems have not met fleet requirements. A new approach to shipboard training is needed to produce instructional methods that are more responsive to fleet priorities and compatible with the constraints of a shipboard environment.

To address this problem, the Navy Personnel Research and Development Center (NAVPERSRANDCEN) is conducting a project to design, develop, and evaluate an approach for identifying shipboard personnel readiness deficiencies and to develop training programs that are compatible with the operational shipboard environment. A pilot effort was established to investigate main propulsion operations on steam powered ships (Main, Abrams, Chiles, Flaningam, & Vorce, 1978). Based on a survey of problems experienced in operating and maintaining steam propulsion systems (Chiles, Abrams, Flaningam, & Vorce, 1981), an overall training strategy was established and the shipboard propulsion plant operator training (SPPOT) program was designed. The initial SPPOT materials and the principles and techniques that were followed in their development are described in two additional reports (Main, Abrams, Chiles, Todd, & Cunanan, 1981; Main, Abrams, Chiles, & Todd, 1982).

Purpose

The purpose of the present effort was to establish principles and guidelines for the development of the final version of SPPOT materials and for their implementation in shipboard environments.

APPROACH

The basic approach was to develop a handbook for guiding the development of SPPOT materials. The development of this handbook was based on experience gained in developing prototype SPPOT materials for different types of ships.

Prototype SPPOT materials were prepared for implementation in the aircraft carrier, USS CONSTELLATION (CV 64), and adapted to a second carrier, USS SARATOGA (CV 60). SPPOT materials consist of four basic types of products:

1. The PQS/SPPOT Qualification 7 Book, which lists the requirements that must be satisfied to qualify for each main propulsion watchstation. This book is similar to the existing Personnel Qualification Standards (PQS) document that is in common use throughout the Navy. The SPPOT version indicates which SPPOT materials are relevant to each of the PQS qualification items and which items can be satisfied by completing specified SPPOT requirements.
2. A SPPOT orientation package, which covers basic knowledge of propulsion systems equipment and procedures that is required by the fundamentals sections of PQS.
3. SPPOT watchstation packages, which cover the type of specific watchstation knowledge required by the systems sections of PQS.

4. SPPOT guides, which organize operational procedures under functional headings, provide alternate paths of action (depending on plant conditions), and indicate the probable results of improper actions.

For the SPPOT materials produced for the carriers, SPPOT guides were designed to cover the portion of each system within a propulsion space as a whole. If several watchstanders are involved in the operation of a system, all the actions performed by those personnel were indicated in the same SPPOT guide. This method of organization was incompatible with that of the engineering operational sequencing system (EOSS). EOSS provides standardized procedures that propulsion watchstanders must refer to in performing propulsion operations; they are oriented to the individual watchstander rather than to the system. Therefore, in developing SPPOT materials for additional ship types, the organization of the SPPOT guides was changed to match that of the EOSS procedures. This latter format was used in developing SPPOT materials for the battleship NEW JERSEY (BB 62) and the 1052-class frigate USS DOWNES (FF 1070). SPPOT materials for DOWNES were then generalized to two additional 1052-class ships, USS LANG (FF 1060) and USS HEPBURN (FF 1055).

The process of developing SPPOT for new classes of ships and generalizing SPPOT materials to similar ships within a class was guided by some overall strategies that remained consistent throughout the effort. These strategies, as described in an earlier report (Main et al., 1981), emphasized the formalization of existing on-the-job training methods through training materials that can be used in the working environment and are performance-oriented. That is, the materials are written from a perspective of job performance and focus on the skills and knowledge that are needed to do the job. In addition, standardized techniques were established for organizing content, displaying graphics, and other such coursework development procedures.

Up to this point, SPPOT has been an applied research program implemented by this Center on a sample of Navy ships. In order to provide for large-scale implementation of SPPOT throughout the fleet, it was essential that an agency be assigned responsibility for the continued development and maintenance of SPPOT materials. The Conventional Marine Propulsion Training Steering Committee assigned this responsibility to the Personnel Qualification Standards Development Group (PQSDEVGRU), which is already responsible for the production of documents to guide the process of watchstander qualification. Therefore, the SPPOT Development Handbook was developed specifically for use by those PQSDEVGRU personnel who would be assigned to develop SPPOT materials. A close working relationship was established between PQSDEVGRU and this Center during the handbook's development.

RESULTS AND CONCLUSIONS

The SPPOT Development Handbook is provided in the appendix. The handbook contains practical information on many aspects of SPPOT development, including methods for determining the scope of tasks covered by SPPOT, sources for deriving technical content, general development principles, formats and procedures for authoring specific SPPOT training components, and methods for validating and implementing resultant SPPOT materials aboard ships. It meets the needs of the primary user, PQSDEVGRU, and is suitable for other agencies desiring information and guidance on SPPOT materials development.

The SPPOT Development Handbook provides a comprehensive and complete description of the procedures that should be followed in developing SPPOT materials. It is essential that these procedures, which have been validated in practical implementation of SPPOT on six different ships, be followed to ensure that their instructional effectiveness is maintained.

REFERENCES

- Chiles, C. R., Abrams, M. L., Flaningam, M. R., & Vorce, R. V. Tailoring shipboard training to fleet performance needs: II. Propulsion engineering problem analysis (NPRDC Tech. Rep. 81-23). San Diego: Navy Personnel Research and Development Center, September 1981. (AD-A105 677)
- Main, R. E., Abrams, M. L., Chiles, C. R., Flaningam, M. R., & Vorce, R. V. Tailoring shipboard training to fleet performance needs: I. Approach and initial efforts (NPRDC Tech. Rep. 78-30). San Diego: Navy Personnel Research and Development Center, August 1978. (AD-A059 292)
- Main, R. E., Abrams, M. L., Chiles, C. R., Todd, J. L., & Cunanan, B. Tailoring shipboard training to fleet performance needs: III. Development of deckplate procedural training for the shipboard propulsion plant operator training (SPPOT) program (NPRDC Tech. Rep. 82-6). San Diego: Navy Personnel Research and Development Center, October 1981. (AD-A107 936)
- Main, R. E., Abrams, M. L., Chiles, C. R., & Todd, J. L. Tailoring shipboard training to fleet performance needs: IV. Training modules and administrative aids for the shipboard propulsion plant operator training (SPPOT) program (NPRDC Tech. Rep. 82-61). San Diego: Navy Personnel Research and Development Center, August, 1982 (AD-A119 459)

APPENDIX
SPPOT DEVELOPMENT HANDBOOK

February 1983

SPPOT DEVELOPMENT HANDBOOK

Ray E. Main
John H. Steinemann
Iver J. Rivenes
James G. Chadbourne

Reviewed by
Joseph C. McLachlan

Released by
James F. Kelly, Jr.
Commanding Officer

Navy Personnel Research and Development Center
San Diego, California 92152

CONTENTS

	Page
INTRODUCTION	1
Purpose of Handbook	1
What this Handbook Provides	1
Who will use this Handbook	1
How the Handbook was Designed	1
Resources Needed for Developing SPPOT Materials	2
What SPPOT Is	2
Purpose of SPPOT Program	2
SPPOT Materials	3
SPPOT Goals and Development Strategies	3
THE SPPOT DEVELOPMENT PROCESS	5
Overall Development Process	5
SPPOT Guides	5
Purpose	5
SPPOT Guide Covers	7
SPPOT Guide Content	8
SPPOT Guide Statements	8
SPPOT Guide Branching	10
SPPOT Guide Caution Statements	11
General Process of SPPOT Guide Development	11
SPPOT Modules	13
Purpose	13
Content	13
Characteristics of Modules	14
General Process of Module Development	18
SPPOT Administrative Materials	20
Purpose	20
Manager's Guide	20
Qualification Section 7 Book	20
Additional SPPOT Materials	21
PRODUCTION AND IMPLEMENTATION	22
SPPOT Production	22
SPPOT Guide	22
SPPOT Modules	22
SPPOT Administrative Documents	22
SPPOT Shipboard Implementation	24
Introduction of SPPOT	24
Installation of SPPOT Materials	25
APPENDIX A--FORMULATING FUNCTIONAL AND ACTION STATEMENTS FOR SPPOT GUIDES	A-0
APPENDIX B--LIST OF MODULE TITLES FOR 1052-CLASS SHIPS	B-0
APPENDIX C--OVERALL AND SECTION DIAGRAMS OF FUEL OIL SERVICE SYSTEM	C-0

INTRODUCTION

Purpose of Handbook

What this Handbook Provides

This handbook is intended to provide procedural guidance for the production of shipboard propulsion plant operator training (SPPOT) materials. SPPOT is a program that will be provided to steam-powered ships in the fleet. The initial research and development of SPPOT was conducted by the Navy Personnel Research and Development Center (NAVPERSRANDCEN).

The handbook contains practical information on many aspects of SPPOT development, including methods for determining the scope, sources for deriving technical content, general development principles, formats and procedures for authoring specific SPPOT training components, and methods for validating and implementing resultant SPPOT materials aboard ship.

The instructions detail methods for developing SPPOT in the most difficult (worst case) situation; that is, for a ship of a class for which there are no previously developed SPPOT materials. Procedures are also provided for situations in which some or most of the relevant SPPOT documentation already exist for similar ships. The process of tailoring existing SPPOT materials to new ships requires considerably less resources and effort than that required for developing completely new materials.

Who will use this Handbook

The primary users of this handbook are the Personnel Qualifications Standards Development Group (PQSDEVGRU), particularly the team of personnel assigned the responsibility for continuing production and implementation of SPPOT. Development team members, including authors, subject matter experts (SMEs), and training specialists, should use this handbook as a working document to guide the design and writing of SPPOT materials. The format of the handbook is designed to ensure its practicality as an "in-hand" guide.

The handbook has less immediate utility for personnel at managerial levels since it does not cover overall policy matters, logistics, and budgets for SPPOT development. These matters usually represent one-time decisions that are made prior to a specified period (e.g., fiscal year) of materials development. Therefore, they are not part of the daily SPPOT production tasks that are the focus of the handbook.

How the Handbook was Designed

The information and guidance provided in this handbook are derived primarily from the experience and lessons learned from the major NAVPERSRANDCEN research and development (R&D) efforts conducted during the period FY 1978 through FY 1982. This effort resulted in the development of the overall SPPOT program design and strategies and implementation of SPPOT in selected Navy ship types, including carrier, battleship, and 1052-class frigate platforms. During this R&D effort, a number of guiding principles were evolved for shipboard training. Alternative approaches and materials were compared, and deficiencies and failures were assessed. As a result, the operational practicality of the training materials was validated.

This handbook was written for the users in the most direct and efficient manner. By closely following the guiding principles and specific directions provided, users will ensure that their resultant products will match the characteristics and proven operational qualities of existing SPPOT materials. This is not meant to imply, however, that every possible alternative has been assessed, or that no procedural or format improvements can be expected with increased experience in SPPOT production and application in the future. In fact, some recommendations for changes to the existing SPPOT materials have been included in the manual.

Resources Needed for Developing SPPOT Materials

The handbook provides some examples of SPPOT materials and guidance for developing the content of the materials, either from existing relevant SPPOT documents or from more primary source documents such as technical manuals, propulsion plant manuals, etc. If relevant SPPOT materials are available, they can often be tailored to meet the specific requirements for other ships within the class and, to some extent, to ships of a different class.

In addition to the handbook itself, resources for the development of SPPOT should include the following:

1. Valid engineering operational sequencing system (EOSS) documents for the designated ship class.
2. Qualification Section 7 of the Personnel Qualification Standard (PQS) for the designated ship class.
3. Additional ship propulsion documents as available, such as the Plant Operating Guide (POG), the Engineering Department Organizational and Regulation Manual (EDORM), and manufacturers' technical manuals for specific equipments.
4. Prototype sets of SPPOT materials for the most closely related systems and equipments.

The personnel resources required for the development team should include:

1. SMEs, preferably those in boiler technician (BT), machinist's mate (MM), and electrician's mate (EM) ratings. These personnel should be experienced propulsion watchstanders, E-7 or above, and qualified as engineering officers of the watch.
2. Authors/technical writers, preferably those who are naive with respect to the specific subject matters.
3. Support personnel (e.g., word processing and production personnel) as required in-house.

What SPPOT Is

Purpose of SPPOT Program

The SPPOT program resulted from a NAVPERSRANDCEN advanced development research effort to identify critical fleet personnel readiness deficiencies and to develop appropriate shipboard training programs. SPPOT was designed, developed, and implemented as a comprehensive training program for propulsion watchstanders. It was

designed to be compatible with the constraints of the shipboard environment and was oriented to the procedural tasks that BT, MM, and EM watchstanders (below supervisory levels) must perform. SPPOT is intended to support and complement existing systems and documents, particularly EOSS and PQS. The watchstander must still follow EOSS procedures in the performance of his duties. SPPOT prepares him for these duties by providing training details that support the EOSS procedures. SPPOT clarifies the relationship between watchstander actions and plant operations and details the consequences of improper procedures. SPPOT provides watchstanders a direct link to qualification on many relevant skill and knowledge factors under PQS but does not include casualty control training.

SPPOT Materials

SPPOT consists of a variety of training materials and aids, as indicated below. Some partial examples are contained in the handbook, but a complete prototype set must be readily available in order to follow the detailed development instructions provided in later sections.

1. SPPOT guides.
2. Training modules--orientation and watchstation modules.
3. Administrative aids--PQS/SPPOT Qualification Section 7 book and Manager's Guide.

SPPOT guides are designed for on-the-job-training (OJT) covering watchstander operating procedures. They detail, in linear format, the sequence of actions performed by the watchstander. The actions are grouped and presented in functional units. In the back of each SPPOT guide, there are sets of statements that caution trainees of the potential consequences of performing a critical action incorrectly. These statements are keyed to appropriate steps in the SPPOT guide and can be used for both instructional and evaluational purposes during the process of qualifying for a watchstation.

There are two types of training modules. The watchstation modules provide detailed knowledge of the operational characteristics of systems, equipments, and components. They cover the physical and functional characteristics of systems and equipment that are specific to particular watchstations. The orientation modules provide background information that is relevant to all watchstation duties (e.g., safety and survival, equipment location and functions, and the basic steam cycle).

The administrative aids are designed to assist the integration of the SPPOT program and the PQS program. The PQS/SPPOT Qualification Section 7 book contains requirements for main propulsion watchstations below supervisors and includes a User's Guide, sign-off sheets for watchstation qualification, SPPOT module sign-off sheets, a list of SPPOT guides, and qualification item sign-off sheets. The Manager's Guide provides a description of the way SPPOT relates to PQS, an overview of the trainee qualification process, and a listing of the primary managerial duties involved in the administration of SPPOT.

SPPOT Goals and Development Strategies

The design of the SPPOT program and the development of the specific SPPOT materials was guided by a number of general goals and strategies. A brief summarization

of these goals and strategies should serve to clarify past decisions concerning SPPOT content and format and to guide future SPPOT development.

The major goals and developmental strategies for SPPOT are listed below. Some of these are fairly obvious without explanation, and some have already been mentioned in prior contexts. All are of sufficient importance to warrant emphasis.

1. OJT Formalization. SPPOT should provide a formalization of current OJT in order to:

- a. Ensure training is standardized and comprehensive.
- b. Ensure adequate documentation is available.
- c. Enable trainees to learn with operational equipment.
- d. Support and complement existing systems such as EOSS and PQS.

2. Materials Design. SPPOT materials should be compact and durable, and designed for use in working environments because:

- a. Watchstanders will not have sufficient time to train outside of the work environment.
- b. It is desirable to train with actual equipments.
- c. Training materials must be protected from humidity, oil, grease, etc.
- d. Trainees must use SPPOT materials while climbing around equipments to perform procedural tasks.
- e. Only a limited amount of storage space is available.

3. Performance Orientation. SPPOT training materials should be performance oriented in order to:

- a. Focus on those essential skills and knowledges that are needed for efficient qualification.
- b. Ensure the trainee has the information he needs to do the job.
- c. Avoid unnecessary front loading on theory and systems relationships.

4. Skills and Knowledge. SPPOT must provide the means for acquiring the following skills and knowledges that are required for main propulsion watchstanders. Many of these skills and knowledges are acquired only through continued exposure to the systems and extensive practice and experience.

- a. Knowledge of the correct manner and order for performing procedural sequences.
- b. Knowledge of the function accomplished when performing each procedure.
- c. Knowledge of the consequences of incorrect procedural performance.
- d. Knowledge of equipment/system operating characteristics and interactions.
- e. Knowledge of operating ranges of equipment indicators.
- f. Knowledge of equipment/component locations.
- g. Various physical, perceptual, and interpretive skills that are necessary to detect and diagnose inappropriate operating symptoms.

The above goals and principles are not mutually exclusive. The development of specific training materials often requires compromises because of competing principles. For example, it is always difficult to restrict content to that which a watchstander needs to know because, in doing so, some important information that might help the trainee to understand or remember the specific procedure at hand may be left out. The real world is

continuous and interrelated. Arbitrary divisions and exclusions made for training purposes always detract, to some degree, from the trainee's ability to understand fully the present task or to learn the next related task. Careful judgment is required to weigh the potential advantages of training enrichment against the practical fact that a trainee cannot try to learn everything at one time, without running the risk of retaining little or nothing.

THE SPPOT DEVELOPMENT PROCESS

Overall Development Process

The manner in which SPPOT materials are developed will vary considerably depending on the type of designated ship and the availability of previously developed SPPOT material for similar systems and equipment. The general process to be followed is presented in schematic summary (Figure 1).

The specific methods and techniques to be used in developing each type of SPPOT product are described in detail in the following sections of the handbook. These SPPOT products include:

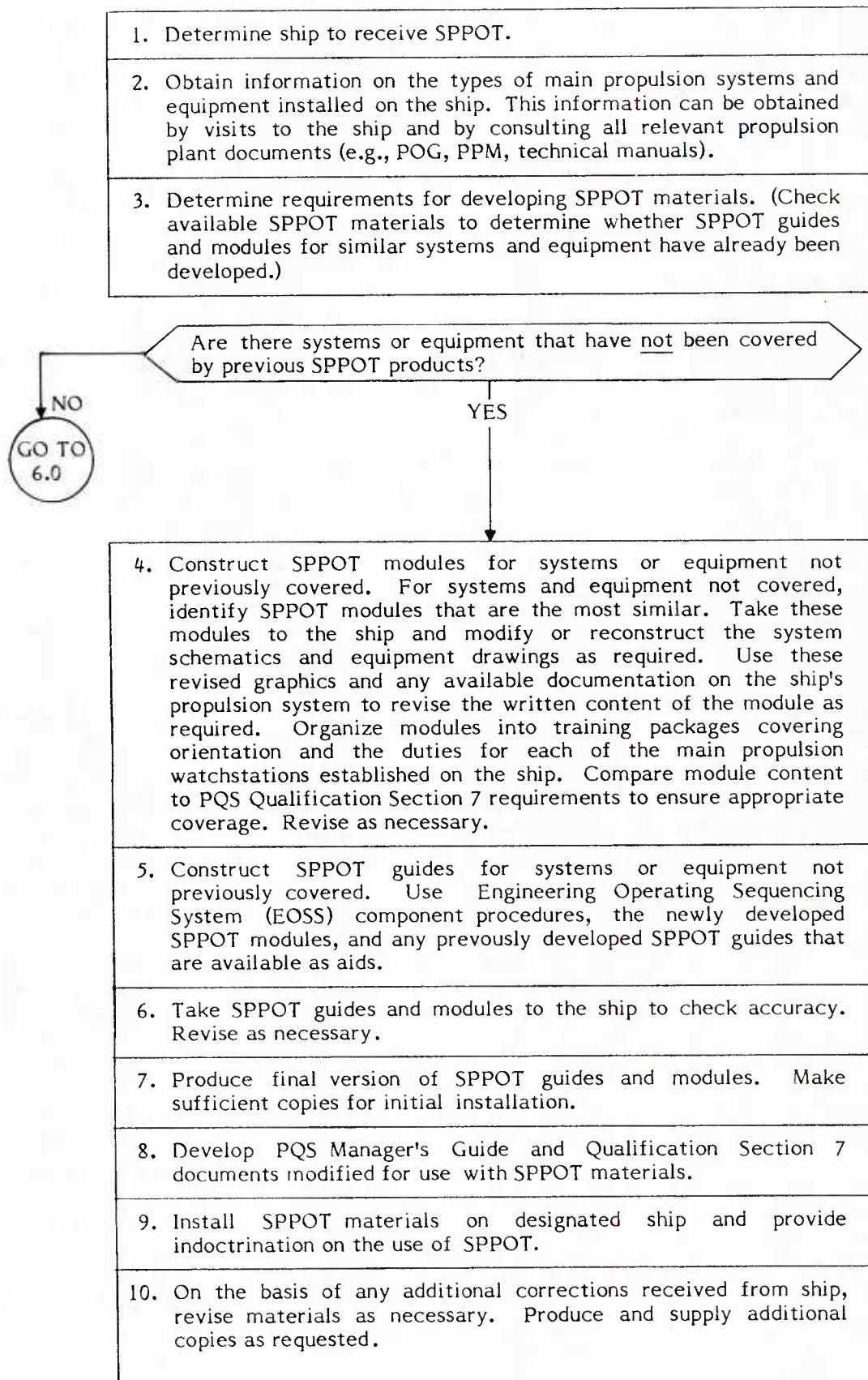
1. SPPOT guides.
2. Training modules-orientation and watchstation modules.
3. Administrative aids-PQS/SPPOT Qualification Section 7 book and Manager's Guide.

SPPOT Guides

Purpose

SPPOT guides are designed to be used as aids in training watchstanders how to perform alignments and operate equipment. When actually performing such tasks, however, watchstanders must use EOSS component procedures to guide their actions. SPPOT guides support the use of EOSS component procedures by explaining how actions are to be performed, what the actions accomplish, and why they are important.

Several types of information are provided in the SPPOT guides. First, there are the action statements listed in the EOSS component procedures. In the SPPOT guides, these actions are grouped under functional headings, which state the function accomplished by the subsumed actions and clarify for the trainee the purpose of his actions. If there are several different ways to perform an operation, the SPPOT guide identifies the possibilities and directs the trainee to the correct procedures for each option. Where remedial procedures may be required, the SPPOT guide specifies the conditions that would indicate a problem and lists the actions the watchstander would take to correct the problem. Finally, the SPPOT guides provide examples of the types of serious problems that could occur if correct operational procedures are not followed. The SPPOT guides serve as a bridge between operational procedures (as listed in the EOSS component procedures) and the operational characteristics of propulsion plant systems and equipment described in the SPPOT watchstander modules. In this manner, the SPPOT guides help the trainee to relate the way that systems and equipment function to the way that they are operated.



SPPOT Guide Covers

Each SPPOT guide contains all the tasks or evolutions that are performed on a given system or equipment. A cover page is provided for each SPPOT guide to indicate the evolutions or tasks to be performed (see Figure 2). The identification code at the top of each SPPOT guide is the same as for the matching EOSS component procedure upon which the SPPOT guide is based. In some cases, there may be several component procedures for the same equipment. These are typically combined in forming the SPPOT guide, and the identification code of each component procedure is included in the SPPOT guide title. In any case, the identification codes are followed by the names of the systems or equipments covered by the SPPOT guide.

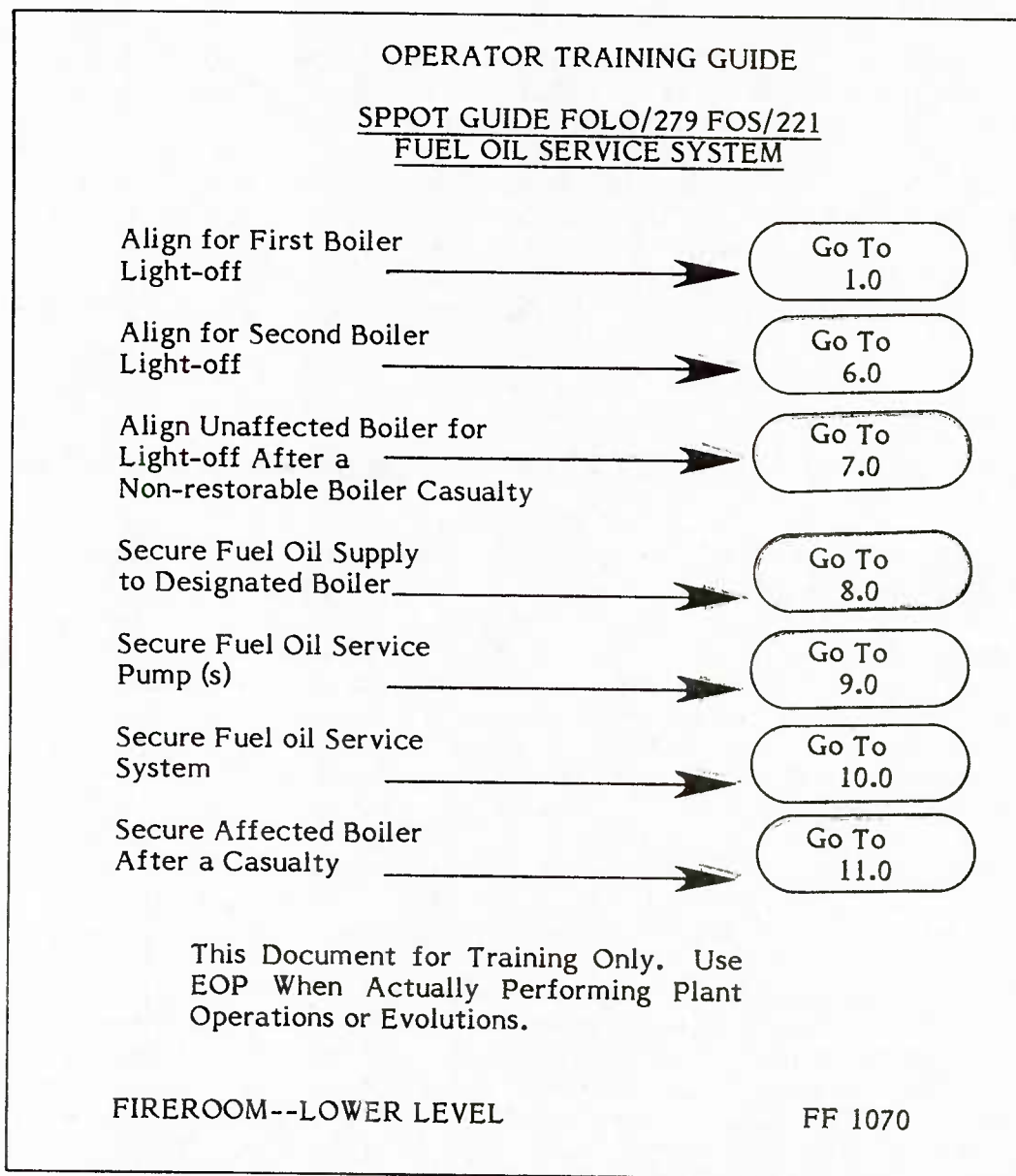


Figure 2. Example of a SPPOT guide cover.

Each task or evolution covered in the SPPOT guide is listed on the cover followed by a locational number. This is done so that the trainee can easily locate a specific task or evolution that he would perform as a unit (e.g., a securing procedure for a piece of equipment). The locational numbers are keyed to functional statements within the SPPOT guide. However, if a task or evolution consists of several numbered sections that are always performed together, only the number of the first section is listed on the cover. Because of this, the numbers on the cover are not always consecutive. The name of the watchstander responsible for the system or equipment, the ship designation and a statement cautioning the user that this document is only to be used for training purposes and is designed to support the use of EOSS appears at the bottom of the cover.

SPPOT Guide Content

In most instances, the SPPOT guide can be organized in the same manner as the EOSS component procedure. Changes may be required where several component procedures are to be covered by the one SPPOT guide or when it is desirable to reduce redundant information. For example, on USS DOWNES (FF 1070), the component procedure PLTO/013 for the lube oil purification and transfer system consists of two separate procedures, one for batch and one for strikedown purification. Since the second half of a batch purification is approximately the same as the procedure for a strikedown purification, the two were combined in the SPPOT guide. The cover provides the starting points for each procedure and entry points for each section that might be performed as a separate unit.

SPPOT Guide Statements

The type of content found in SPPOT guides is illustrated in Figure 3 and described below.

1. Functional statements. Note that all content is organized under numbered functional statements, which indicate what is to be accomplished. Typically, two levels of functional statements are provided. Higher level statements (such as 3.0) indicate the major evolutions or task segments that are involved in working with the systems or equipments. They are always separately enclosed in rectangular boxes that extend to the left of the other content. Lower level statements (such as 3.1 and 3.2) indicate the purpose of related sequences of actions. They are enclosed in shorter rectangular boxes and underlined to separate them from other content. Where SPPOT guides are relatively short and simple, lower level statements may not be required.

2. Action statements. Normally, action statements are enclosed in the same box as the lower level functional statement (e.g., 3.1 and 3.2). Where several different lines of action are possible, questions are inserted between action statements, as in 2.4.

3. Question statements. Question statements are always enclosed in pointed boxes. They may be used to indicate (a) which of several possible procedures is to be performed (e.g., "Is a batch or strikedown purification to be performed?"), (b) whether or not a particular process is required (e.g., "Is motor driven forced draft blower to be secured?"), or (c) whether or not a particular condition exists (e.g., "Is the reading on the superheater outlet temperature gage between 300° F and 410° F?"). Note that, whenever a reading is called for, the indicator is specified by name in the question.

4. Arrows. Arrows are used to direct trainees to alternate sets of actions. Typically, an arrow is placed down the middle if additional steps are required, down the

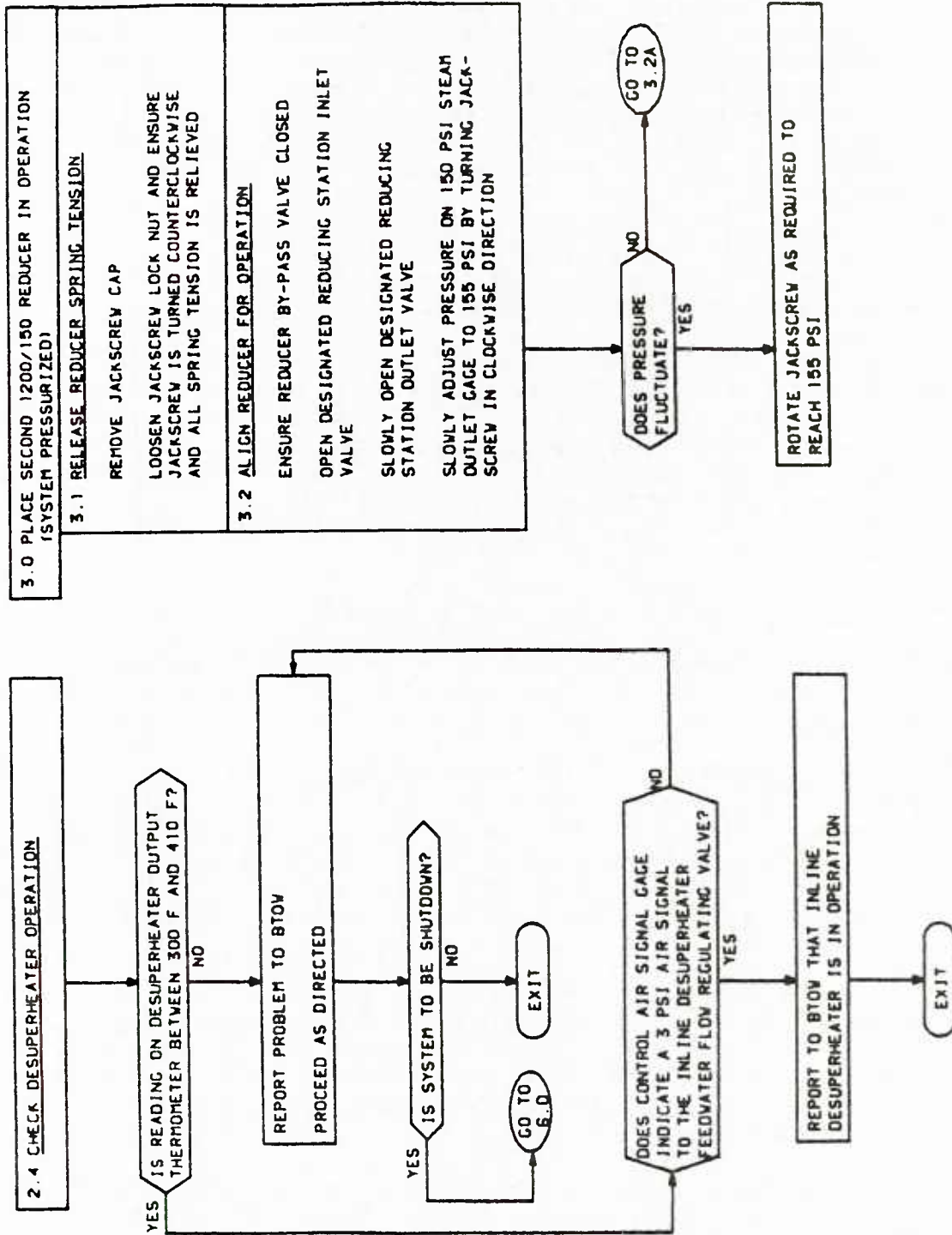


Figure 3. Example of SPPOT guide content.

left-hand side if no further actions are required, and up the right-hand side when a return loop is indicated (see 2.4). Arrows should not be allowed to cross other arrows.

5. Positional statements. To avoid crossing arrows, a "Go To" statement can be used (see 2.4). "Go To" statements are enclosed in ellipses and indicate the number of the functional heading that should be accomplished next. The "Go To" statement may indicate a location on the same page, an advanced page, or a previous page. If it is desirable to direct the trainee to a specific action or question rather than to a numbered functional heading, a letter identification is added to the "Go To" statement (e.g., "Go To 3.2A"). In this case, the appropriate step would occur on another page and be identified by an ellipse marked 3.2A, which would be attached to the appropriate point in the procedure with an arrow.

6. Exit statements. Exit statements are used to indicate either that a procedure has been completed or that it cannot be continued at this time. Exit statements are enclosed in boxes with rounded ends (see Figure 3).

7. Report statements. Report statements indicate a communication between the watchstander and his supervisor. Typically, report statements are treated as action statements and enclosed in rectangular boxes under their respective functional headings. However, a report statement at the end of a procedure may not be related to any specific function but to the entire procedure. For example, in Figure 3, the statement "Report to BTOW that inline desuperheater is in operation" does not relate just to 2.4 but to all the functional steps under 2.0. Such report statements are always enclosed in separate rectangular boxes.

SPPOT Guide Branching

Combinations of statements, questions, and arrows can be used to branch procedures into alternate lines of actions. SPPOT guides should be branched for any of the following conditions.

1. Functional branching. Wherever there are two or more ways of performing a procedure, each of which is described by a series of functional statements, a functional branching is indicated. A functional branch is introduced by a question that indicates the possible choices to be made (e.g., "Is main steam to be supplied from own space or by cross-connecting?"). Depending on the response to the question, the reader is directed to an appropriate higher-order functional statement (e.g., 3.0 align main steam by cross-connecting).

2. Contingency branching. Whenever there is a functional statement, which indicates a condition to be accomplished, there should be a question statement to indicate whether or not the condition was successfully established. If it was not, a remedial loop should be provided to indicate what, if any, actions should be taken by the watchstander to correct the situation. Remedial loops should include any communications that take place between watchstanders and their supervisors.

3. Multiple-choice branching. In some instances, a watchstander will be selecting a single operation or alignment from several choices. This occurs for procedures where a number of alternative equipments may be used (e.g., combinations of boilers, fuel oil pumps, and fuel oil tanks for aligning the fuel oil service system) or where water or oil is to be pumped from one specific location to another (e.g., aligning a lube oil purifier). Where multiple-choice branching is accomplished through a series of decisions, they may be handled with a series of questions. For example, where one of four fuel oil service

tanks at different locations may be used, insert the question, "Is a forward or aft fuel oil service tank to be used?," followed by the second question, "Is a port or starboard fuel oil tank to be used?"

SPPOT Guide Caution Statements

Caution statements are warnings to the trainee that indicate what could happen if procedures are not performed correctly. These statements help to emphasize the relationship between the trainee's actions and the operation of the plant. They are provided to motivate the trainee to perform required actions in a safe and consistent manner. Even if a watchstander knows he is supposed to perform operations in a specified manner, he may be tempted to skip alignment checks or forget to use the approved procedure unless he is well aware of the dangers that can result from such actions. Caution statements are developed by having an SME review the SPPOT guide to identify those steps that are often skipped or performed incorrectly and are likely to result in personnel injury and/or damage to equipment.

For each step identified, a caution statement is written. Each caution statement is structured into three parts and written in the general form. "If this is not done--this would occur. Because of this." For example:

IF ONE OF THE DESIGNATED SUCTION VALVES WERE NOT
OPENED AND THE PUMP WAS PLACED IN OPERATION--PUMP
END DAMAGE MAY RESULT. BECAUSE, WITH ITS SUCTION
BLOCKED, PUMP MAY OVERHEAT.

Note that the first part of the caution statement indicates an improper action or omission; the second, the outcome in terms of damage, injury, or inability to operate; and the third, the reason for the problem.

Caution statements have already been developed for most of the types of problem situations that can occur in propulsion plants. Typically, an SME will be able to review these statements and determine which statements are applicable to which SPPOT guides. However, if new statements are required a naive writer should be involved in preparing the statement to ensure that it will be clear to the inexperienced trainee.

Each caution statement is labeled with a capital letter (A-Z). If the SPPOT guide has too many statements, a continuation with double letters may be required (AB, AC, AD, etc.). The statements, along with their letter designations, are listed at the end of each SPPOT guide. Since the letter designation for a particular caution statement is inserted into the SPPOT guide wherever relevant, the letter designation for a particular caution statement may appear several times in the same SPPOT guide. Letter designations are placed alongside the appropriate action just to the right of the boxes.

General Process of SPPOT Guide Development

This section provides a set of general guidelines for developing a SPPOT guide. The development steps required under conditions where a SPPOT guide has already been developed for a similar system or equipment are considerably different from those required under conditions where a relatively new or different type of system is involved. Most of the steps can be performed by an SME with a strong technical expertise for the tasks in question. However, certain operations are better performed by a naive writer; these are specifically identified.

1. Determine if appropriate SPPOT guide prototypes are available. Initially, the SPPOT guides that were designed for NEW JERSEY (BB 62) and for several 1052/1058-class frigates will be available. Since the frigates employ mostly motor--driven equipment, the NEW JERSEY SPPOT guides should be consulted for statements concerning turbine-driven equipment. As more ships become covered by SPPOT, it should be possible to be more precise in matching systems and equipments to previously completed SPPOT guides.

2. Identify SPPOT guides to be developed. If systems are similar to those already covered by SPPOT, the existing SPPOT guides should be replicated with changes. If systems differ from those already covered, the EOSS component procedures should be consulted to determine the types of SPPOT guides that will be required.

3. Develop SPPOT guides. First, establish the organization of the SPPOT guide and develop a cover page (see Figure 2). Second, identify functional headings for the SPPOT guide. If SPPOT guides for similar systems are available, they should provide most of the required headings. If new headings must be constructed, care should be taken to ensure that the wording of the statements is compatible with those used for other SPPOT guides. Third, add in the action statements, questions, communications, "Go To" statements, and directional arrows as indicated on pages 8 and 9. A set of guidelines for writing functional headings, action statements, and questions is provided in Appendix A.

Whenever new functional headings or questions are required, a writer without technical expertise should be involved. The writer should question a technical expert to obtain a clear perspective on the nature of the function (i.e., what is being accomplished by the actions). The writer should then formulate and phrase the statement so that a naive reader can understand from the statement what is being accomplished. However, the terminology used should be compatible with that used on the deckplates.

4. Review SPPOT guides. Completed SPPOT guides should be reviewed by (a) an SME for technical accuracy, and (b) a naive writer for format and clarity. The writer should check to ensure that:

a. All statements are complete. There should be a functional heading for each action sequence and one or more actions indicated under each functional heading.

b. Functional headings are organized properly. Subheadings should only be used when a higher level functional heading is to be structured into two or more sections.

c. All functional statements are meaningful. They should be as specific as possible and should clarify the purpose of the actions, rather than just provide a label.

d. All statements and questions are worded in the same standard format used in other SPPOT guides and all required information is provided. (Note that the wording of SPPOT guides may differ from that of the EOSS component procedures.)

e. Questions clarify procedural alternatives in terms that are meaningful to a naive reader. If readings are involved, the indicator device should be specified.

f. All boxes and arrows are drawn and positioned correctly.

g. All directions are logical and can be followed without difficulty.

h. Paths are provided for getting to each and every set of actions listed in the SPPOT guide.

i. Methods used to direct the reader to another page or to a different SPPOT guide have the correct formats and number designations.

In addition to the above format checks, the writer should check the SPPOT guide against the EOSS component procedures and any relevant SPPOT watchstation modules to ensure they are compatible and that nothing has been left out.

5. Develop caution statements. Where possible, use the same caution statements that were developed for previous SPPOT guides. Where necessary, have SMEs work in conjunction with naive writers to develop new caution statements as indicated on page 11.

6. Number SPPOT guide pages. At the bottom of each SPPOT guide page is the SPPOT guide designator (e.g., CAA/106), the page designation (e.g., Page 3 of 10), and the ship designation (e.g., FF 1070).

SPPOT Modules

Purpose

SPPOT modules provide the trainee with basic knowledge about the duties of propulsion watchstanders and the characteristics of propulsion systems and components. This module information helps the trainee to understand the procedures prescribed by the SPPOT guides. Modules not only teach trainees what procedures to perform and how to perform them, but why the procedures must be performed in the prescribed manner.

Content

The content of the modules is, by necessity, somewhat different from that of the guides. The guides describe specific operational procedures, while the modules elaborate on the characteristics of systems and equipment and how they function in order to clarify the implications of the specified operator actions described in the guides. Unless the watchstanders understand each system in its totality, it will be difficult for them to perceive the logic that underlies the system's operation. However, the module content is kept watchstander-specific to the extent that each is written for personnel with specific duties or assignments, and they are grouped into packages according to specific levels of watchstander skill development and qualification.

The module content is limited to that information most relevant to the task that must be performed. To determine what content is relevant information, judgment must be made as to whether the information will (1) aid the watchstander to perform assigned duties, (2) help trainees understand the rationale for performing in a specified manner, or (3) facilitate learning or retention of correct task procedures. Types of information that are provided as relevant in terms of aiding performance and understanding include:

1. Names and functions of systems, equipments, and components.
2. Photographs and drawings of systems, components, parts, and devices.
3. Significant operational parameters (e.g., temperatures, pressures).

4. Explanations of sequential processes (e.g., energy conversions, flow paths).
5. Summaries of major watchstander duties to point up relationships between functional characteristics and the way in which systems are operated.

Relevant information to aid learning and retention includes:

1. Statements of training and testing objectives.
2. Overviews of systems operations that structure procedures into meaningful subgroups.

Information that is not considered to be relevant module content includes that which is:

1. Applicable to tasks that are not part of watchstanding (e.g., corrective maintenance).
2. Required for personnel at a higher level of watch responsibility than that for which the trainee is being qualified.
3. More detailed or complex than that needed to perform required actions, or to appreciate the consequences of performed actions. (Many theoretical principles of propulsion engineering are thus excluded.)

Characteristics of Modules

There are two general types of SPPOT modules--orientation modules and watchstation modules. The following descriptions and guidance will be made more meaningful by having a sample set of SPPOT modules immediately at hand for illustrative reference.

Orientation modules. These modules provide information that the trainee should have before being assigned to a watchstation. Table 1 provides a list of the orientation modules that comprise the complete SPPOT orientation package. The modules include a general introduction to the duties and assignments of propulsion watchstanders, safety and survival information, an explanation of the basic steam cycle, descriptions of the functions and locations of major equipment, and descriptions of components that are common to many of the systems found in propulsion plants, including valves, pumps, turbines, and indicating instruments.

Each orientation module begins with a statement of what content will be covered and how the trainee will be tested. Whenever the characteristics of equipment or components are discussed, a drawing is provided to depict relevant features. Drawings are kept as simple as possible, with detail added only when necessary to aid recognition of internal or external features. When two or more components are compared, special care should be taken that the drawings emphasize the key distinguishing features. All drawings are titled and labeled with the same names and headings used in the text.

Table 1
List of Orientation Modules

Introduction to main propulsion watchstanding
Safety
Survival
Basic steam cycle
Major components in the generation phase
Major equipment in the expansion phase
Major equipment in the condensation phase
Major equipment in the feed phase
Operating temperatures and pressures in the basic steam cycle
Location of major main space equipment
Major steam piping systems
Valves, valve position, and operation
Auxiliary turbines
Pumps
Indicating instruments
Lubrication

Text content must be kept brief and simple. Wherever possible, tables are used to organize content into units that can be easily recognized or compared. Figure 4 is an example of a table designed to aid learning of component functions, and Figure 5, of a table designed to aid comparisons of functions and characteristics among components.

Exercises are provided throughout the modules. Typically, information covered by exercises is also covered in the summary tests. The exercises and tests include questions on watchstander duties; names, locations, functions and characteristics of equipment and components; directions of flow through systems and equipment; parameter settings; and readings of various indicating devices. The summary tests are administered by trainers/supervisors after completion of modules to focus the attention of the trainee on significant content and to promote retention of vital information. These tests and exercises are designed to reflect the practical knowledge and skills needed by the trainee on the job. For example, they require the trainee to take readings from drawings of gage faces, and they ask for those set points and operating ranges that watchstanders should know from memory. Where appropriate, testing is conducted in the work spaces so that trainees can interact with the actual equipment.

EQUIPMENT	FUNCTION
Ship's Whistle	Used to signal intentions and conditions.
Main Engine Gland Seal Regulator	Seals the glands to keep air out of the main engine and main condenser.
Main and Auxiliary Air Ejectors	Removes air and gases from the main and auxiliary condensers.
Constant and Intermittent Steam Reducers	Provides steam for cooking and heating.
Crossconnect Valve	Isolates 150 PSI auxiliary steam system in one space from an adjacent space.
Aux. Exhaust Augmenting Reducing Station	Reduces 150 PSI auxiliary steam for use by auxiliary exhaust system if pressure from auxiliary turbine exhaust is insufficient.

Figure 4. Table designed to aid learning of functions.

SUMMARY OF PUMPS

PUMP TYPE	PUMPING MECHANISM	TYPE(S) OF FLUID(S) PUMPED	REQUIRE FLOODED CASING?	VALVE POSITIONING FOR START-UP
Centrifugal	Impeller	Water	Yes	Open suction valve before starting. Keep discharge valve closed until discharge pressure is established.
Propeller	Propeller	Water	Yes	Open suction and main condenser overboard discharge valves before starting.
Rotary	Gears or screws	Oil	No	Open suction, discharge, and recirculating valves (where installed) before starting.
Reciprocating	Piston/plunger	Water, oil, and air	No	Open suction and discharge valves before starting.
Jet	Nozzle	Air and water	No	Open discharge valve before starting. <u>Do not</u> open suction valve until flow is established.

Figure 5. Table designed to aid comparison of characteristics.

Watchstation modules. Watchstation modules cover the physical and functional characteristics of the systems and equipment that are to be operated by all the watchstanders designated in the Qualification Section 7 document except supervisors. The watchstander modules generally cover the same areas as the PQS fundamentals and systems items.

The watchstation modules are organized into packages, one for each watchstation. Each watchstation package contains modules for each system or equipment that is aligned or operated by the watchstander assigned to that watchstation. Watchstation packages may include modules that cover generic processes that are independent of specific systems or equipment. Since more than one watchstander may interact with the same system, a given module may appear in more than one watchstation package. A listing of the modules contained in each of the watchstation packages for 1052-class ships (Appendix B) illustrates how equipment and systems operations are allotted, and sometimes shared, among watchstations.

The SPPOT watchstation modules are written and formatted in generally the same manner as the orientation modules. At the front of each watchstation package is a table of contents listing the numbers and titles of all of the watchstation modules contained in that package. This is followed by an introduction, which explains how the modules are to be used. Typically, the introduction begins with brief statements on (1) what the system or equipment does, (2) why it is important, and (3) who operates it. These statements do not provide a detailed or complete description of components and functions but only sufficient information to ensure that the trainee has a general idea of the role played by the system or equipment in the operation of the propulsion plant. If a system is complex and has several major sections, each with unique functions, these may also be identified. This information is followed by brief statements on (1) what the trainee will learn in the module and (2) how he will be tested.

The body of the module contains text, diagrams, and tables that explain how the system or equipment operates. Text is used for discussing the general purpose of the system or equipment and for tracking sequences of related events (such as flow of fluid, stages of operations, or physical relationships). Components in the diagrams are numbered in a logical sequence and referenced by number as well as by name in the text. Tables are used to list components shown in the diagrams and summarize their functions (especially those components that are not discussed in the text). Any safety devices or safety procedures are starred in the tables and diagrams to emphasize their importance.

For complex systems containing several subsystems, a brief overview of the entire system is given, followed by separate discussions of each of the subsystems. Similarly, if a number of related components are to be separately described in some detail, an overview of the components is presented first within the context of the system. Extended discussions of complex components are separated into paragraphs to emphasize the major points of importance to the trainees.

Diagrams are constructed in generally the same manner as those in the orientation modules. Because of the relatively greater complexity of the diagrams used in the watchstation modules, greater care must be taken in their arrangement. When the amount of information involved is not excessive, both names and numbers are provided in the diagrams. If the amount of detail interferes with the clarity of the diagrams, however, the names of the components are dropped and only the numbers are used to identify components. When diagrams are too complex, they are broken up and displayed in

sections on separate pages. In such cases, an effort is made to show clearly how the different sections fit together to form the overall system. When possible, an overall summary diagram is also provided to show how the different sections fit together. Appendix C provides an example of how diagrams are used for an overall system and for different sections of the system.

Most of the piping diagrams presented in the watchstation modules are schematics and show functional rather than physical locations. However, bulkheads are shown when systems cross from one propulsion space to another. Diagrams are always placed on pages facing the text or tables that describe them. For extended presentations, the same diagrams may be repeated several times to maintain the juxtaposition of diagrams and text.

Exercises are similar to those found in the orientation modules. Most of the modules have exercises that require the trainee to interact with the equipment and components in his work space. For modules that cover system alignments, the exercises also require the trainees to trace the systems and to draw them on plant layout diagrams provided at the end of the module.

General Process of Module Development

The process of developing SPPOT modules for a specific ship will follow the general procedures for SPPOT development outlined in Figure 1, particularly Step 4. The development task is much simpler if there are existing modules for similar ships that cover the same systems or equipments than if there are none.

Most of the following development steps will require an SME with considerable technical knowledge and experience in the operational tasks involved. As indicated, however, the text should be written and reviewed by a good, but technically naive, writer to ensure that the content is written with sufficient clarity to be understood by inexperienced trainees.

1. Determine if appropriate SPPOT module prototypes are available. Begin by matching existing SPPOT modules for the most similar ship to the systems and equipments on the designated ship. Identify differences or omissions in systems or equipments by comparing the existing module schematics and drawings against the systems and equipments aboard the designated ship. Where coverage of a specific equipment or component is missing, it may still be found in the existing modules from some other ship. As increasing numbers of ships receive the SPPOT program, there will be less likelihood of finding any systems or equipment that have not been covered by some previously developed module.

2. Develop/revise SPPOT modules as needed. For systems or equipments which have not been covered, construct or modify systems schematics and equipment drawings as required by referring back to the ship documents and information sources listed under SPPOT development resources (See Introduction, page 2). Refer to these resulting graphics, and any other appropriate ship propulsion system documentation, in developing the written content of the modules. Be sure that the constituent parts of each module (e.g., introductory system function statements, learning goals, text, test criteria, exercises) are written in accordance with the content and format requirements previously specified in this handbook and represented in prototype SPPOT modules. Organize the modules into training packages according to the duties of each of the main propulsion watchstations established on the ship.

3. Review the SPPOT modules. The completed modules should be reviewed for technical accuracy by the SMEs and for content format and comprehensibility by naive writers. The technical review should include a detailed check of the module content against PQS Qualification Section 7 requirements to ensure that all appropriate PQS fundamentals and systems items have been adequately covered. It should also be verified that any additions or changes that have been made in the modules are also accurately paralleled in the SPPOT guide. The module content and format review should include attention to the following specific details:

a. Do the introductory statements clearly explain the purpose and importance of the system or equipment in relation to other systems? (e.g., "The main steam system is important because it is used to distribute and control the flow of main steam to the main steam system components. Without the main steam system, the ship could not move, the boilers could not get water, and the ship would have no electricity.")

b. Do the statements describing what is to be learned and how it is to be tested accurately reflect the exercises and tests throughout the module?

c. Are the drawings and schematics arranged and numbered so that flow paths through the system can be clearly perceived, or are arrows or additional indicators needed for clarification?

d. Are captions and numbers arranged and applied in a clear and consistent manner?

e. Are titles and component names in the drawings identical to those used in the tables and text? Is there consistency in the nomenclature that is applied to any given component appearing in different modules or parts of modules?

f. Are numbers on the drawings arranged in some logical order to facilitate rapid part identification and system understanding?

g. Do the tables list all the valves and components that are shown on the associated drawing?

h. Do the captions on the drawings aid understanding or do they clutter and confuse the drawing? (Note. If too many captions are required, the parts in the drawing may be identified by number only, with the corresponding names appearing only in text and tables.)

i. Does the content of the drawings correspond exactly with the content of the associated text? That is, does each drawing show only those components that are covered in the text, and are the components mentioned in the text represented in the drawing?

j. Are the drawings and tables arranged face to face so the trainee can refer to both without flipping pages?

The foregoing items are examples of the types of specific checks that should be made during the format review of the SPPOT modules. However, a total review of the entire module should be conducted by a naive reviewer to ensure that a clear and understandable presentation of training content has been provided.

SPPOT Administrative Materials

Purpose

The primary function of SPPOT administrative materials is to integrate SPPOT into the process of watch qualification. Since shipboard watch qualification is administered under the personnel qualification standard (PQS) program, modified versions of PQS documents were developed to establish guidelines for incorporating SPPOT into the process. Two documents, a Manager's Guide and a Qualification Section 7 document were developed for this purpose.

Manager's Guide

The Manager's Guide consists of three parts: (1) a summary description of SPPOT materials and how they relate to PQS, (2) an overview of the process of watchstander qualification using SPPOT, and (3) a listing of manager duties at different levels of SPPOT implementation. The content of this guide should be virtually the same from one ship type to another.

Qualification Section 7 Book

The Qualification Section 7 book is similar to the official PQS document normally distributed aboard ships for qualification of propulsion watchstanders. The major difference is that the modified version specifies how SPPOT materials are to be used in the overall process of qualification.

1. Section I. This section of the document is a User's Guide that explains how the SPPOT program is to be used with PQS. This should be the same for all ships.

2. Section II. This section indicates what PQS fundamentals and system items (7100 and 7200 items) are not covered by SPPOT modules. PQS items not covered by SPPOT are still requirements that must be satisfied for watch qualification. The trainee will acquire the information he needs for these requirements in the same manner he would have done before SPPOT was available; that is, by referring to appropriate manuals and documents. The appropriate references are provided in Section II. In the prototype SPPOT materials for 1052/1078-class ships, there were a considerable number of PQS fundamental and system items not covered by SPPOT, especially for watch supervisors. It is hoped that, in the continuing evaluation of the SPPOT program, a closer tracking can be established between PQS items and SPPOT content so that discrepancies can be sharply reduced or eliminated. If all discrepancies were resolved, the section for PQS items not covered by SPPOT would not be required.

3. Section III. The rest of the body of the Qualification Section 7 document contains signoff sheets for verifying and recording the completion of qualification requirements. Section III contains final sign-off sheets for each watch station. These are the same as are found in standard PQS Qualification Section 7 documents, except that one PQS percentage point is assigned for each item.

4. Section IV. This section contains sign-off sheets for SPPOT orientation modules and check-off sheets for watchstation modules. Note that the check-off sheets for the watchstation modules do not assign points or require signatures. They only provide a tracking system. The sign-offs for the watchstation modules are in Section VI, along with the sign-offs for watchstander tasks. The check-off sheets are needed because the same module may occur for several different watchstations. Once a watchstation module is

signed off in Section VI, it should also be checked off in Section IV so that the next time the module is encountered the trainee will have a ready reference to verify that it has been completed.

For the 1052-class prototype Qualification Section 7 documents, most of the watchstation modules listed in Section IV are related to PQS task requirements listed in Section VI. For those modules that are not covered by PQS task requirements, additional task requirement statements should be developed.

5. Section V. This section contains sign-off sheets for PQS items not covered by SPPOT. Percentage points are also indicated (one point per item). As the continuing development of SPPOT provides a broad coverage of PQS items, Section V can be reduced and, eventually, eliminated in the same manner as Section II.

6. Section VI. This section contains the sign-off sheets for watchstation PQS task items and for SPPOT modules. At the start of each watchstation presented under Section VI is a statement that indicates what prerequisites must have been completed before the trainee can begin to qualify for the watchstation. Also included in the statement are the numbers of PQS fundamentals and system items not covered by SPPOT materials. These are the items identified in Section II and signed off in Section V. One percentage point is given for each item. All of these items should be completed before any of the task items are started.

PQS task items are listed in a table along with the appropriate SPPOT modules that relate to that task. Signatures and PQS percentage completion points are assigned for each task item and each module. Note that percentage points assigned for PQS task items and SPPOT modules, when added to percentage points for the PQS fundamentals and system items not covered by SPPOT, add up to only 90 percent. The remaining 10 percent covers emergency conditions and unusual operations which are also not covered by SPPOT.

For each task, the trainee should complete all relevant modules before attempting to perform the procedures. If the same module is relevant to several tasks, it is listed each time but marked with an asterisk to cue the trainee that he should check Section IV to determine if he has already completed the requirement. If a SPPOT guide is available that is relevant to the task, it is indicated in parentheses following the task statement.

Section VI will vary from ship to ship, depending on the watchstations to be covered and on the tasks that are assigned to each watchstation. For tasks where no relevant SPPOT guides or SPPOT modules are indicated, a decision must be made as to whether additional SPPOT materials are needed and should be developed.

7. Appendices. In the back of the Qualification Section 7 book, two appendices are provided. The first consists of instructions for using SPPOT materials. This should remain the same from ship to ship. The second consists of a listing of SPPOT guide titles organized by watchstation. This list may vary from ship to ship. (Note that the same SPPOT guide may be listed under several watchstations.)

Additional SPPOT Materials

Some SPPOT materials have been developed for watchstations not included in the PQS Qualification Section 7 documents. These include watchstations for some auxiliary spaces and for the electrical distribution system. It is recommended that PQS SPPOT qualification documents be established to cover these watchstations as well. It should be noted that the watchstation package for the electrician's mate differs from other

watchstation packages in that it is less basic in its instructional content and it contains SPPOT guides as well as watchstation modules. The content was less detailed because personnel who operate the electrical distribution systems typically have received training in fundamentals. The SPPOT guides were attached to the watchstation package rather than being separated in pocket--sized laminated packs because the watchstander is not required to move around the potentially hostile propulsion plant environment while learning to perform his duties.

PRODUCTION AND IMPLEMENTATION

SPPOT Production

In producing SPPOT materials for shipboard use, the guidelines listed below should be observed.

SPPOT GUIDE

1. SPPOT guides should be placed on computer tapes and maintained to facilitate changes or corrections.

2. SPPOT guide containers should be constructed so that the guides can be placed in strategic locations in propulsion spaces. A recommended set of specifications for these containers is provided in Figure 6. Containers should be constructed for each propulsion space so that there are enough containers to hold all the SPPOT guides assigned to that space. It is desirable to have the names of the SPPOT guides for a given watchstation punched on colored plastic tape and displayed on the outside of the container. These names should be color coded so that a different color is used for each watchstation. Similarly, the cover of each SPPOT guide should be marked with a piece of color tape that matches the color-coded name on the outside of the container.

3. For each ship, four complete sets of SPPOT guides should be printed on 8-½ X 11" paper. For two of the sets, the pages should be folded in half and trimmed to 4 X 7-3/16" size and covered with a 5-mil lamination of 4-3/16" X 7-3/4". One set of these laminated guides should be placed in the work spaces, and another set should be kept as a spare. The additional sets of nonlaminated SPPOT guides should be placed in three-ring binders as reference copies. Each binder should contain a table of contents and separators to identify the position of each SPPOT guide.

SPPOT Modules

1. SPPOT modules should be packaged in comb-bound books, one for the orientation modules and one for each watchstation package.

2. For the initial production, enough watchstation packages should be duplicated to provide each watchstander a copy of the package for the watchstation for which he is currently qualified, and also to provide a 6-months' supply for newly qualifying watchstanders. Orientation packages should be produced in a sufficient quantity to provide a copy for each messenger and cold iron watch, and also provide a 6-months' supply for new watchstanders.

SPPOT Administrative Documents

1. Comb bindings should be used for the Qualification Section 7 book and the Manager's Guide.

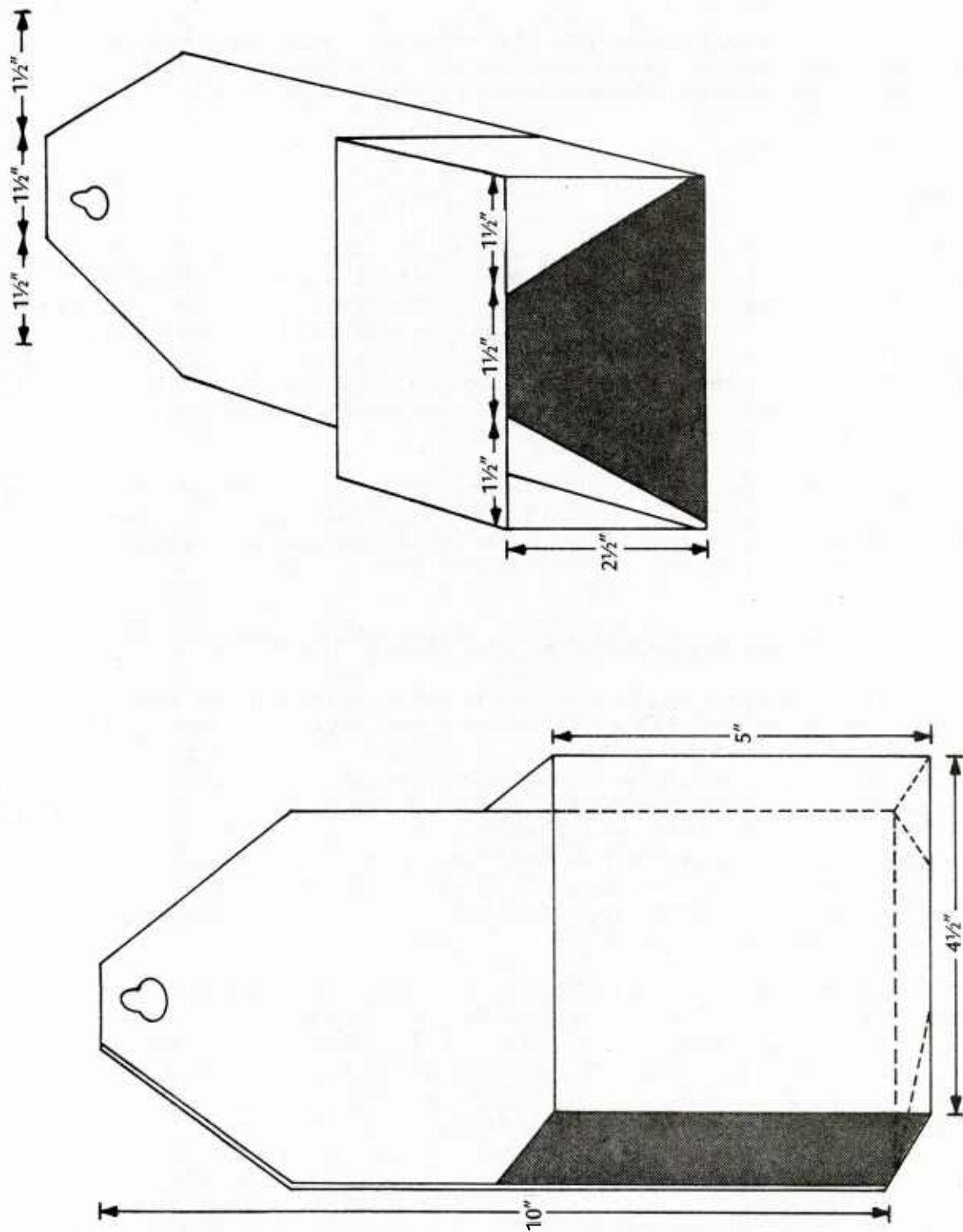


Figure 6. Specifications for SPPOT Guide Containers.

2. Sufficient Qualification Section 7 books should be produced to provide one to each watchstander and to provide a 6-months' supply for new watchstanders.

3. Manager's Guides should be produced in sufficient number to provide copies to all officers and enlisted personnel involved in qualifying watchstanders, and to provide a 6-months' supply for new personnel who will become involved in SPPOT management.

SPPOT Shipboard Implementation

Introduction of SPPOT

At the time SPPOT materials are provided to each ship, an implementation team (preferably an officer, a boiler technician, a machinist's mate, and an electrician's mate) should provide an informational presentation to all ships personnel who will be involved in the management and administration of the SPPOT program. This presentation can be guided by the content of the Manager's Guide. In addition, demonstrations should be given to show how the trainee would use his Qualification Section 7 book to identify the SPPOT guides and SPPOT modules that he will work with, and how PQS percentage points will be assigned and tracked.

The role of SPPOT guides in the qualification process is not as obvious as is the role of the SPPOT modules. For this reason, the following explanation of the rationale for using SPPOT guides was developed for use in the initial presentation of SPPOT materials to ships:

SPECIAL INSTRUCTIONS FOR USING SPPOT GUIDES

SPPOT guides should be used by trainees in learning to perform their watchstation duties because the guides provide an understanding of how a watchstander's performance is related to the operation of the system or equipment. The SPPOT guides form a critical link between the system information presented in the modules and the watchstander behaviors that are laid out in the EOSS component procedures. A trainee may know how he is supposed to align a system or operate an equipment, but if he doesn't understand the reasons behind his actions, he may become careless or attempt to take short cuts that can lead to trouble.

The only way to ensure that a trainee does understand how his actions relate to plant operations is to test his ability to relate watchstander actions to their effects. SPPOT guides are designed to aid in this testing process. The watchstander who is qualifying the trainee should question him concerning the purpose of his actions while he is performing walk-throughs of each procedure. The trainee should be allowed to use a component procedure but not a SPPOT guide during the testing procedure.

In testing the trainee's knowledge, the qualifying watchstander should ensure that the trainee can:

1. Readily locate each component named in the component procedure.

2. Simulate any required action. (For example, in checking the position of valves, the trainee should be asked what direction he would turn the valve to ensure it was closed or open.)

3. Indicate the result of his actions on the operation of the plant. (For example, isolating an equipment from steam or ensuring cooling water is aligned to an equipment.)

4. Indicate the results of omissions or incorrect procedures such as are indicated in SPPOT guide caution statements. (For example, "What would happen if this drain valve were opened fully rather than cracked open?")

5. Indicate what remedial steps would be taken if specified conditions (temperatures, pressures, rate of flow, etc.) could not be established.

In evaluating the trainee, it is appropriate for the qualifying watchstander to check samples of behavior rather than each and every possible response. It is important, however, that a broad sample of behaviors be checked. If the trainee cannot perform effectively and answer related questions, he should be referred back to the appropriate SPPOT guide for additional study and practice.

Installation of SPPOT Materials

SPPOT guide containers should be installed at a central location in each propulsion space. They should be firmly attached to bulkheads or braces. SPPOT guides should be placed in their respective containers according to color codings.

Each watchstander should be given a PQS/SPPOT Qualification Section 7 book to replace his old qualification document. All completed watchstation signoffs should be transferred to the new book. All trainees under qualification for a watchstation should switch over to the new qualification system.

All qualified watchstanders should be given SPPOT watchstation packages for thier present watchstation and encouraged to review the materials so that they can use them effectively in training others. Messengers and cold iron watches should be given orientation packages to review.

Shipboard personnel involved in the management of PQS should be given the PQS/SPPOT management guides. These personnel should then change their PQS progress charts to conform to the new qualification system and distribute SPPOT materials to new watchstation trainees as required.

All propulsion personnel should be encouraged to review SPPOT materials to ensure that they correspond to the ship's existing propulsion systems. Any errors that are discovered should be documented by ship's personnel and submitted to PQSDEVGRU so that corrections can be made.

APPENDIX A

**FORMULATING FUNCTIONAL AND ACTION STATEMENTS
AND QUESTIONS FOR SPPOT GUIDES**

FORMULATING FUNCTIONAL AND ACTION STATEMENTS AND QUESTIONS FOR SPPOT GUIDES

This appendix provides examples of the three major types of statements found in SPPOT Guides: functional statements, action statements, and questions.

Functional Statements

Functional statements indicate what is to be accomplished. There are two levels of functional statements: higher order and lower order. Every SPPOT guide will have two or more higher order functional statements. A given SPPOT guide may or may not have lower order functional statements. When a higher order function can be broken down into several groupings of related actions, lower order functional statements are used to identify each grouping.

Examples of Higher Order Functional Statements

ALIGN FOR MANUAL RECIRCULATION
BOTTOM BLOW BOILER
ENSURE MAIN LUBE OIL PURIFIER OPERATION NORMAL
INSPECT AND CLEAN SSTG LUBE OIL STRAINERS
PREPARE COMPRESSOR FOR START UP
SHIFT, CLEAN, AND INSPECT LUBE OIL STRAINERS
SECURE LUBE OIL PURIFIER

Examples of Lower Order Functional Statements

ALIGN SALT WATER TO MAIN CONDENSER
ENSURE LUBE OIL COOLER IS ISOLATED FROM SALT WATER
FILL CONDENSER WITH SEA WATER
ISOLATE DESUPERHEATER FROM STEAM AND FEEDWATER
REMOVE AND CLEAN LUBE OIL PURIFIER
SECURE FEEDWATER SYSTEM

Action Statements

Action statements indicate what the watchstander does to satisfy a functional statement. Examples of action statements would include:

ADJUST PACKING GLAND NUTS TO INCREASE/DECREASE LEAK-OFF AS DIRECTED BY WATCH SUPERVISOR

CLOSE FEEDWATER PUMP SEA SUCTION VALVE

CRACK OPEN FEEDWATER PUMP VENT VALVE UNTIL ALL AIR EXPELLED, THEN CLOSE

DEPRESS PUMP "STOP/RESET" BUTTON

ENSURE FOLLOWING VALVES ARE CLOSED

NOTIFY FIREROOM TO OPEN CONDENSER FILLLINE STOP VALVE FROM DE-AERATING FEED TANK

PLACE AUXILIARY CONDENSATE PUMP MOTOR CONTROLLER SWITCH IN "OFF" POSITION

REPORT PROBLEM TO WATCH SUPERVISOR

TURN SALINITY INDICATOR METER SELECTOR SWITCH TO CELL NO C5

Questions

Questions are used to indicate (1) which of several possible procedures is to be followed, (2) whether or not a particular process is required, or (3) whether or not a particular condition exists. Examples of questions include:

ARE THERE UNUSUAL NOISES OR VIBRATIONS?

DID CLOSE INDICATOR LIGHT GO ON?

HAS READING ON LUBE OIL COOLER OIL OUTLET THERMOMETERS RISEN ABOVE 90 DEGREES F.?

IS LUBE OIL SAMPLE CLEAR?

IS LUBE OIL TO BE TRANSFERRED TO THE LUBE OIL SUMP OF THE FORCED DRAFT BLOWER, MAIN FEED PUMP, SHIPS SERVICE TURBO GENERATOR, OR MAIN ENGINE?

IS MAIN DRAINAGE OR FUEL OIL TRANSFER SYSTEM TO BE USED?

IS SSTG TO BE SECURED?

WAS REPORT RECEIVED ELECTRICAL POWER NOW AVAILABLE?

APPENDIX B
LIST OF MODULE TITLES FOR
1052-CLASS SHIPS

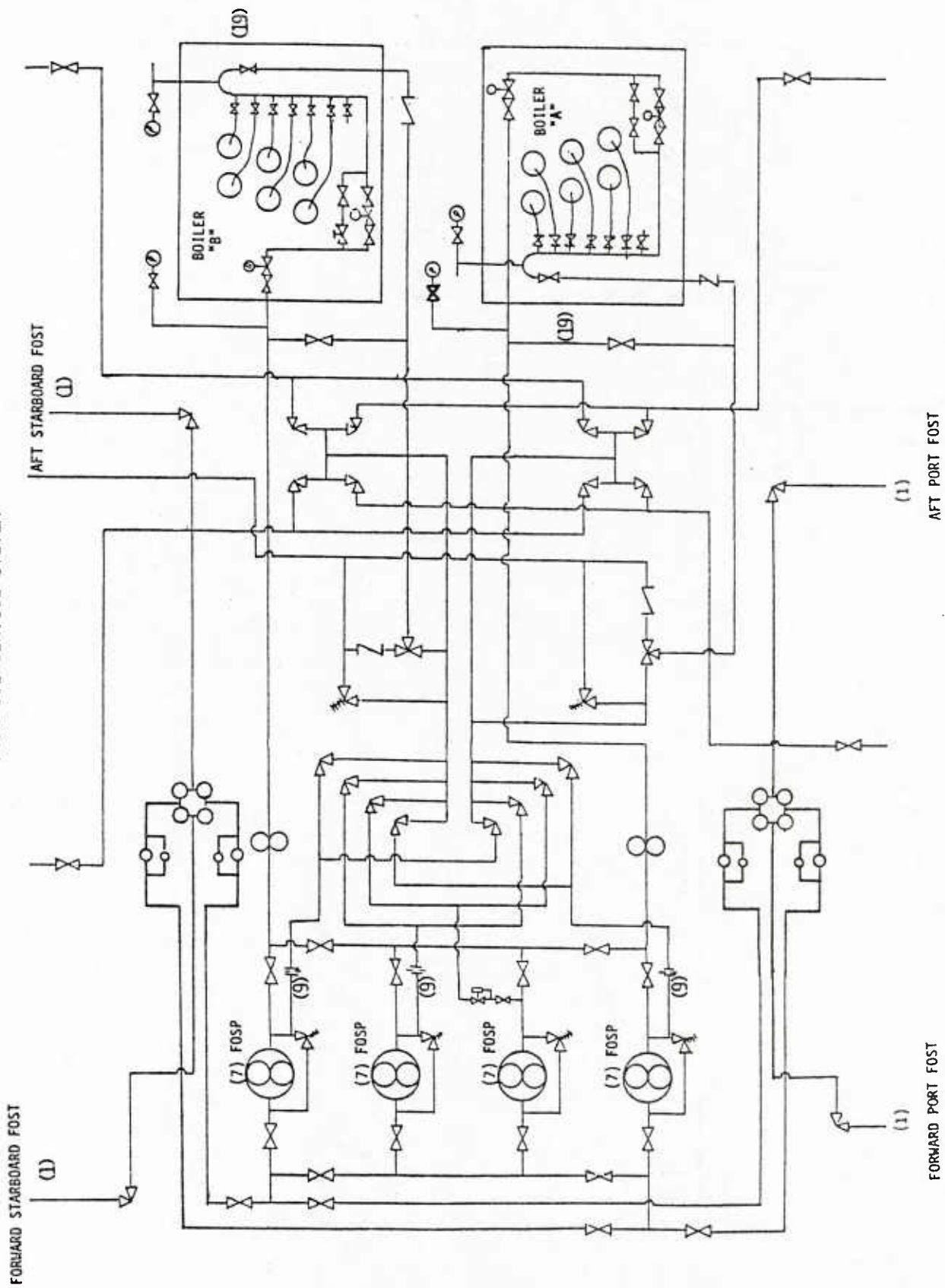
LIST OF MODULE TITLES FOR 1052-CLASS SHIPS

Module Number	Title
Orientation Modules	
7101	Lubrication
7101.1	Introduction to main propulsion watchstanding
7101.2	Location of major main space equipment
7101.3	Valves, valve position, and operation
7101.4	Auxiliary turbines
7101.5	Pumps
7101.6	Indicating instruments
7102.1	Basic steam cycle
7102.2	Major components in the generation phase
7102.3	Major equipment in the expansion phase
7102.4	Major equipment in the condensation phase
7102.5	Major equipment in the feed phase
7102.6	Operating temperatures and pressures in the basic steam cycle
7102.7	Major steam piping systems
7103.1	Safety
7103.2	Survival
Watchstation Modules	
7202	Introduction to the combustion engineering "D" type boiler
7202.1	Boiler protection system
7202.2	Boiler surface and bottom blow system
7202.4	Boiler front operations
7202.5	Boiler front fittings
7202.6	Boiler chemical injection system
7202.7	Boiler soot blower system
7203	Fuel oil service system
7203.1	Fuel oil duplex strainers
7204	Forced draft blowers
7205	Main steam system
7206	1200 PSI auxiliary steam system
7208	150 PSI auxiliary steam system
7209	Main engine and reduction gears
7209.1	Main engine jacking gear
7210	Main condenser circulating water system
7211	Main condensate system
7211.2	DFT
7212	Main air removal system
7213	Main engine gland seal system
7214	Freshwater drain collecting and morpholine injection system
7214.17	Freshwater and high pressure drain system
7215	Main lube oil system
7215.1	Lube oil duplex strainers

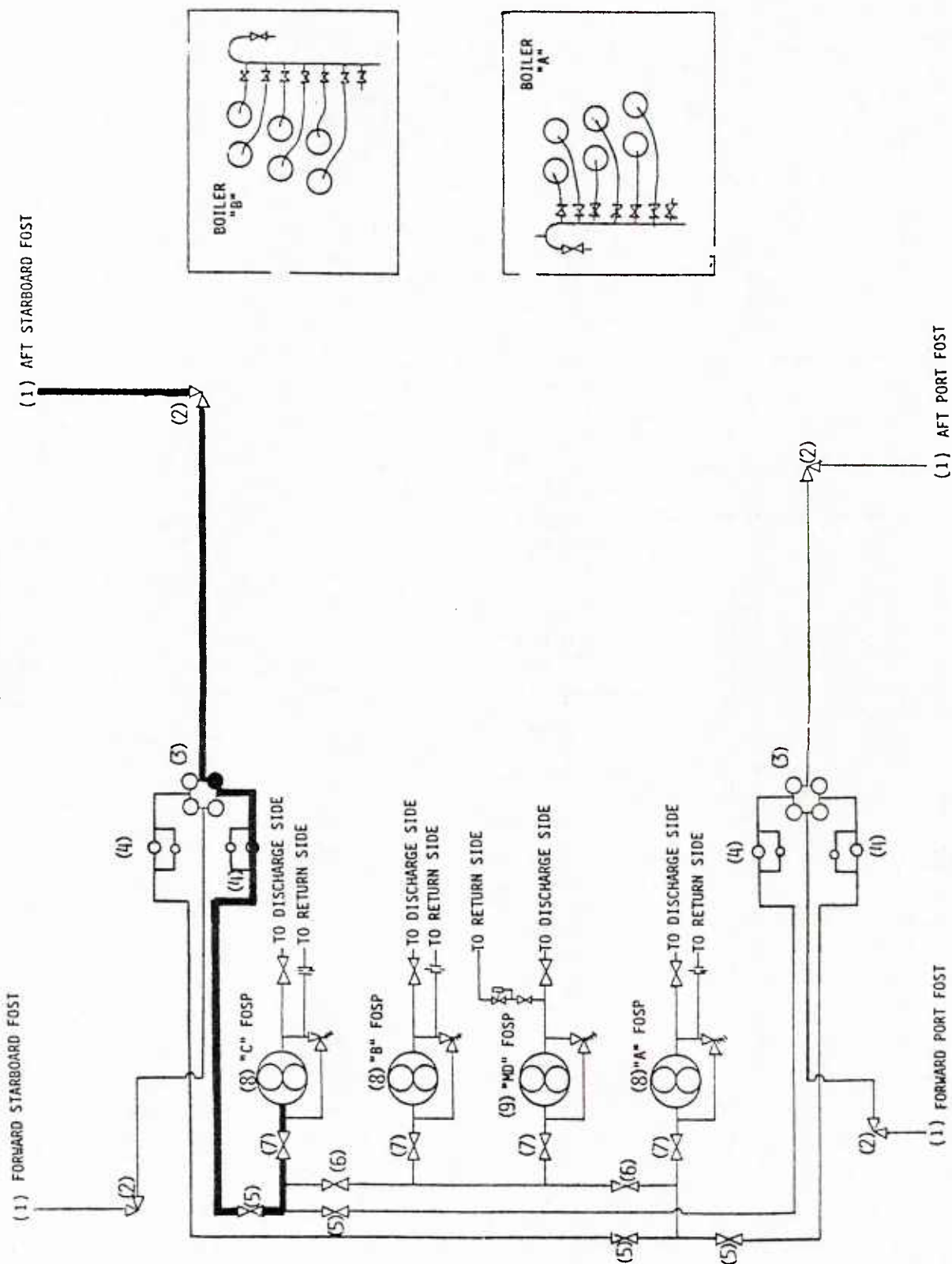
Module Number	Title
Watchstation Modules (Continued)	
7216	Auxiliary exhaust steam system
7218	Main feed system
7218.1	Main feed booster system
7219	Ship's service turbogenerator
7223	Auxiliary gland exhaust system
7224	Auxiliary machinery cooling water system
7225	Lube oil purification system
7225.1	Main lube oil purifier
7226	Low pressure air system
7226.1	Automatic boiler control (ABC) air
7227	Hotel steam system
7228	Distilling plant
7229	Main shafting
7230	Main drain system
7231	Firemain system
7233	Bilge and stripping system
7234.1	Taking soundings and samples
7235	Fuel oil fill, storage, and transfer system
7236	High pressure air system
7302	Taking reading and checking lube oil sumps
7308	Taking readings and checking shaft alleys
7308.1	Key valves and controllers

APPENDIX C
OVERALL AND SECTION DIAGRAMS OF
FUEL OIL SERVICE SYSTEM

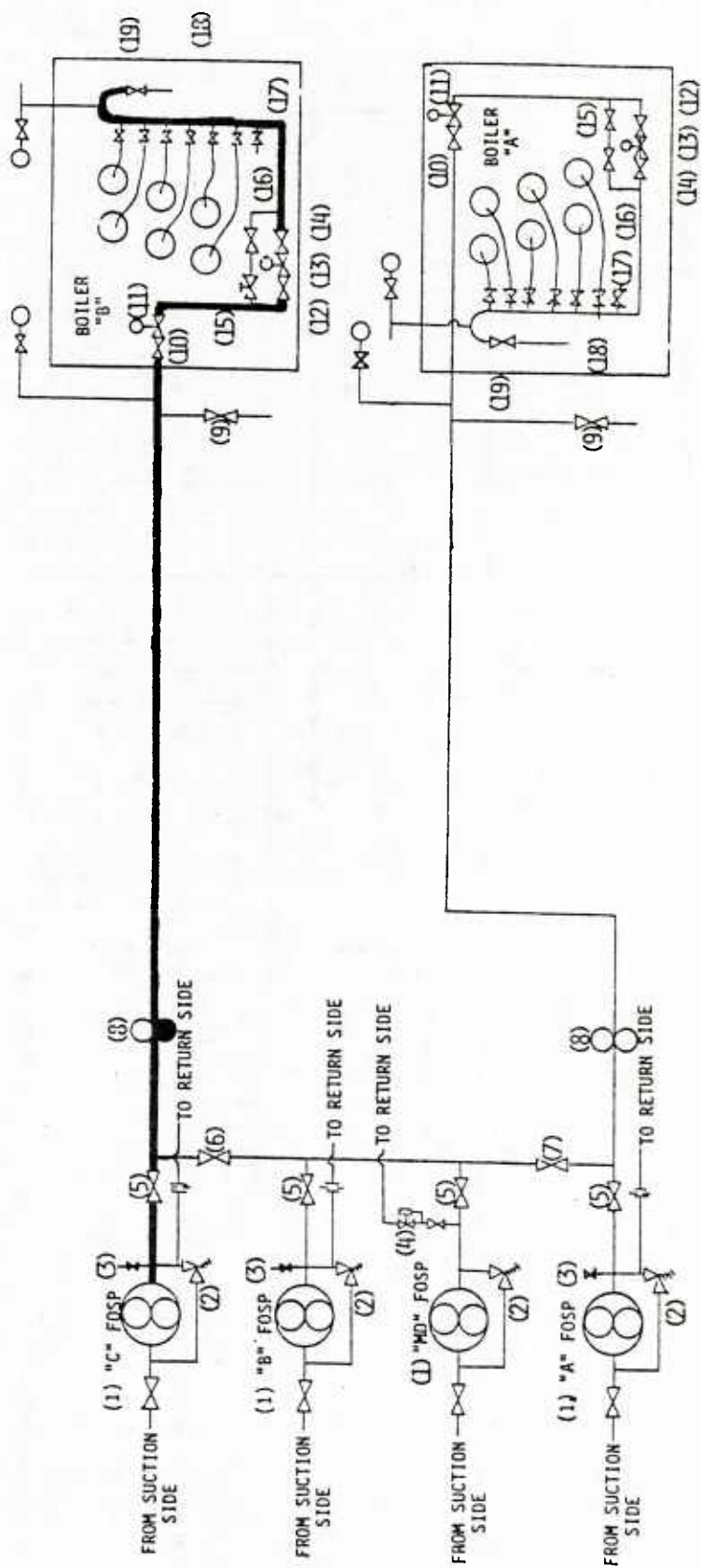
FUEL OIL SERVICE SYSTEM

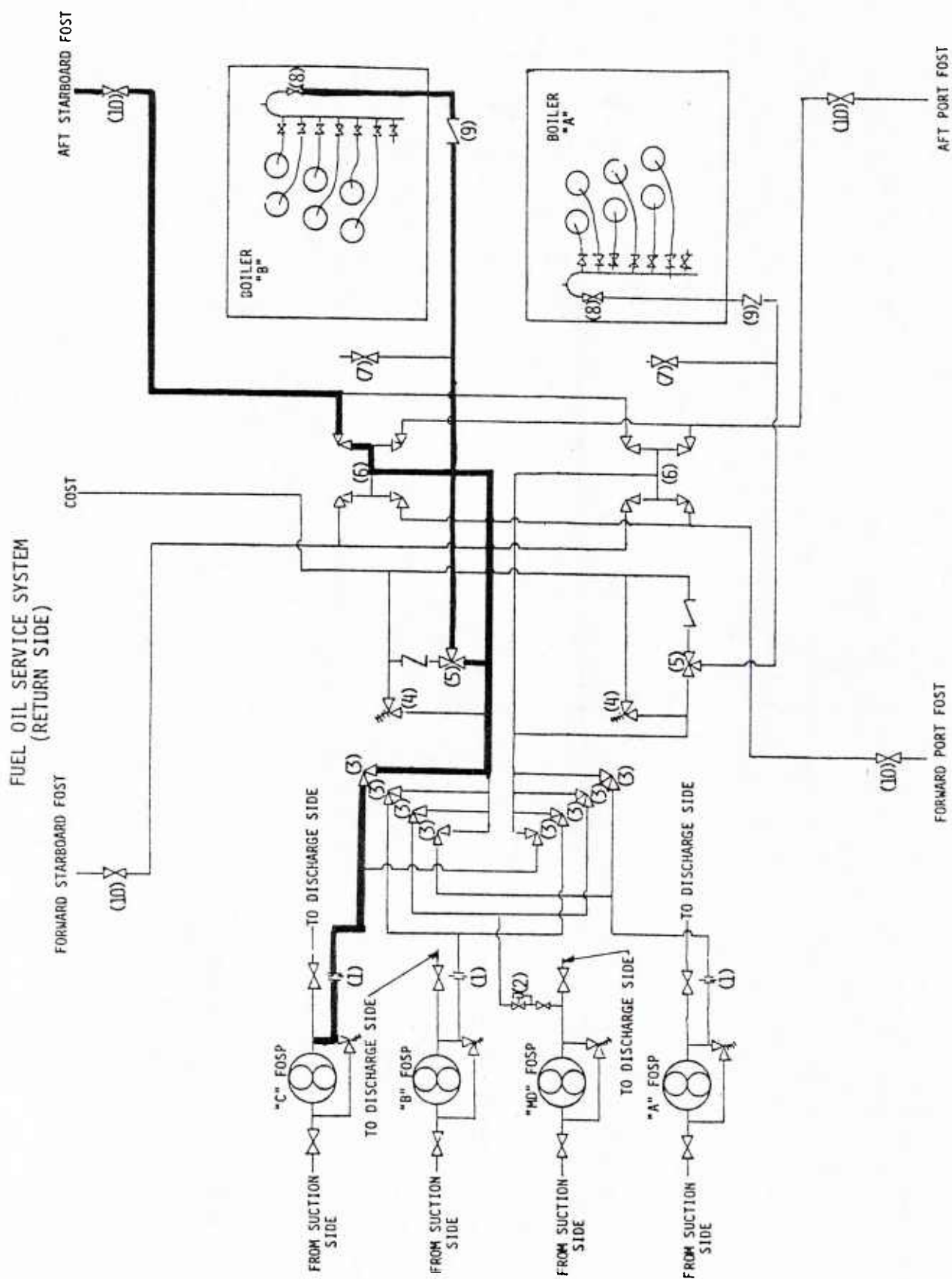


FUEL OIL SUCTION SYSTEM (SUCTION SIDE)



FUEL OIL SERVICE SYSTEM (DISCHARGE SIDE)





DISTRIBUTION LIST

Deputy Under Secretary of Defense for Research and Engineering (Research and Advanced Technology)
Deputy Assistant Secretary of the Navy (CPP/EEO)
Chief of Naval Operations (OP-01), (OP-03), (OP-05), (OP-11), (OP-12) (2), (OP-13), (OP-14), (OP-15), (OP-43), (OP-55), (OP-115) (2), (OP-140F2), (OP-114F), (OP-987H)
Chief of Naval Material (NMAT 00), (NMAT 04), (NMAT 08)
Chief of Naval Research (Code 200), (Code 440) (3), (Code 442), (Code 442PT)
Chief of Information (OI-213)
Chief of Naval Education and Training (02), (022), (003), (019), (N-2), (N-3), (N-5), (N-9)
Commander in Chief U.S. Pacific Fleet
Commander in Chief, U.S. Atlantic Fleet, Propulsion Examining Board
Commander in Chief, U.S. Pacific Fleet, Propulsion Examining Board
Commander Naval Air Force, U.S. Atlantic Fleet
Commander Naval Air Force, U.S. Pacific Fleet
Commander Naval Sea Systems Command
Commander Naval Surface Force, U.S. Atlantic Fleet
Commander Naval Surface Force, U.S. Pacific Fleet
Commander Naval Military Personnel Command (NMPC-013C)
Commander Submarine Force, U.S. Atlantic Fleet
Commander Submarine Force, U.S. Pacific Fleet
Commander Training Command, U.S. Atlantic Fleet
Commander Training Command, U.S. Pacific Fleet
Commanding Officer, Fleet Training Center, Norfolk
Commanding Officer, Fleet Training Center, San Diego
Commanding Officer, Naval Damage Control Training Center
Commanding Officer, Naval Education and Training Program Development Center (Technical Library) (2)
Commanding Officer, Naval Education and Training Support Center, Pacific
Commanding Officer, Naval Nuclear Power Training Unit, Idaho Falls
Commanding Officer, Naval Regional Medical Center, Portsmouth (ATTN: Medical Library)
Commanding Officer, Naval Technical Training Center, Corry Station (Code 101B)
Commanding Officer, Service School Command, Great Lakes
Commanding Officer, Service School Command, San Diego (Code 3200)
Commanding Officer, Surface Warfare Officers School Command
Commanding Officer, USS AMERICA (CV 66)
Commanding Officer, USS CONSTELLATION (CV 64)
Commanding Officer, USS CORAL SEA (CV 43)
Commanding Officer, USS DWIGHT D. EISENHOWER (CVN 69)
Commanding Officer, USS ENTERPRISE (CVN 65)
Commanding Officer, USS FORRESTAL (CV 59)
Commanding Officer, USS INDEPENDENCE (CV 62)
Commanding Officer, USS JOHN F. KENNEDY (CV 67)
Commanding Officer, USS KITTY HAWK (CV 63)
Commanding Officer, USS MIDWAY (CV 41)
Commanding Officer, USS NIMITZ (CVN 68)
Commanding Officer, USS RANGER (CV 61)
Commanding Officer, USS SARATOGA (CV 60)
Director, Defense Activity for Non-Traditional Education Support
Director, Management Information and Instructional Activity Branch Office, Memphis
Director, Naval Civilian Personnel Command

Director, Naval Education and Training Program Development Center Detachment, Great Lakes
Director, Naval Education and Training Program Development Center Detachment, Memphis
Director, Training Analysis and Evaluation Group (TAEG)
Officer in Charge, Central Test Site for Personnel and Training Evaluation Program
Superintendent, Naval Postgraduate School
Commander, Army Research Institute for the Behavioral and Social Sciences, Alexandria (PERI-ASL)
Chief, Army Research Institute Field Unit, Fort Harrison
Commander, Air Force Human Resources Laboratory, Brooks Air Force Base
Commandant Coast Guard Headquarters
Commanding Officer, U.S. Coast Guard Institute
Commanding Officer, U.S. Coast Guard Research and Development Center, Avery Point
Commanding Officer, U.S. Coast Guard Training Center, Alameda
Superintendent, U.S. Coast Guard Academy
President, National Defense University (3)
Director, Science and Technology, Library of Congress
Defense Technical Information Center (DDA) (12)

U206194

DEPARTMENT OF THE NAVY

NAVY PERSONNEL RESEARCH AND
DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE \$300

POSTAGE AND FEES PAID
DEPARTMENT OF THE NAVY
DOD-316

